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THE ORDOVICIAN ROCKS OF LAKE TIMISKAMING

by

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INTRODUCTION.

The isolated Silurian rocks of Lake Timiskaming have long been of interest to the geologist. Sir Wm. Logan described them first in 1845 and again in the Geology of Canada, 1863, (page 335.) In 1897, Dr. A. E. Barlow described these rocks in the annual report of the Geological Survey of Canada. Logan, in his description, states, "at Lake Temiscamang, there are found lying on the Niagara limestone, loose angular fragments of dolomite, resembling that of the Birdseye and Black River formation of Lacloche and Lake Nipissing, and holding *Strophomena alternata*, species of *Maclurea* like *M. magna*, and *M. Atlantica*, *Orthoceras anceps*, and *O. proteiforme*. The source of these fragments has not yet been ascertained." Barlow quotes from Logan and says further:[1] "The lake is here over 200 feet in depth and it is just possible that below the Niagara limestone and concealed beneath the waters of the lake there exists an area of Cambro-Silurian rocks." Until last autumn this was the status of our knowledge of the Ordovician rocks of this region.

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[1]Geol. Surv., Canada, Vol. X, 1897, p. 124 I.

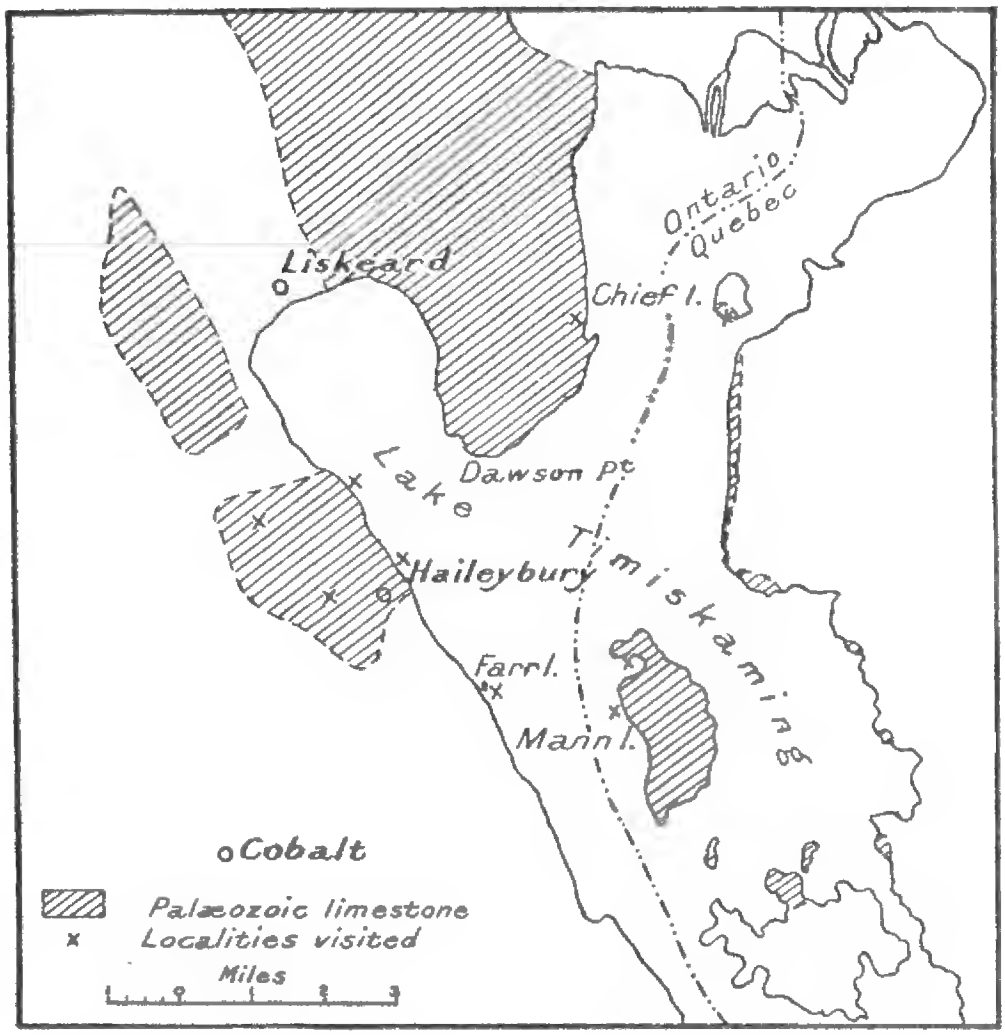

Figure 1. Index map. Localities visited indicated by crosses.

FIELD WORK AND SUMMARY.

During the last week of October 1914, the writer spent three days making a reconnaissance stratigraphic study of the Palæozoic rocks of the northern end of Lake Timiskaming. The following localities were visited: the dolomite outcrops immediately west of Haileybury; the outcrops on the beach between the wharf at Haileybury and Moore creek 1½ miles to the north; the east side of Wabi or Dawson point; Chief island; the west side of Mann island; and Farr or Percy island.

As determined from fossils collected at the above localities, the dolomites west and north of Haileybury are of Black River age; the upper strata of Mann island and the top of Farr island belong near the base of the Niagara; the Dawson Point section includes besides undetermined beds at the base, the Niagara from its base to the horizon of numerous corals; Chief island contains in the patches of limestone resting upon the Huronian, representatives of both Niagara and Trenton rocks; a limited area of Silurian strata occurs north of the wharf at Haileybury; and the green calcareous shales making up the lower part of the section at the northwestern end of Mann island and probably concealed by talus on the eastern side of Dawson point, must be between Black River and Niagara in age.

DETAILED STATEMENT.

The best exposures of Ordovician strata are those in the vicinity of Haileybury. At the western edge of the town a 12-foot section is exposed in Farr's quarry from which building stone was taken for the Holy Cross cathedral and other buildings in Haileybury. As is the general rule with the Palæozoic strata of Lake Timiskaming, the beds are nearly horizontal. The dolomite is light grey in colour, weathering buff, and occurs in beds averaging about 1 foot in thickness. According to an analysis made by the Bureau of Mines[1] of Ontario, this dolomite contains 29·50 per cent lime and 21·59 per cent magnesia; and therefore, approaches a true dolomite in composition.

[1]Report of the Bureau of Mines, Vol XIX, Pt. II, p. 107.

The following fossils were obtained from this quarry: undetermined ostracod, *Strophomena incurvata* (Shephard)? *Plectorthis* sp., *Maclurea logani* Salter, *Cyrtoceras constricto-striatum* Hall.

At a small escarpment along the road between lots 8 and 9, Bucke township, just south of Dickson creek, dolomite similar to that of Farr's quarry furnished the following fossils: *Receptaculites occidentalis* Salter, *Zaphrentis* small, crinoid columns, and *Maclurea logani* Salter.

On the shore of Lake Timiskaming just south of Moore creek, and about 185 feet lower than the above occurrences, the following fossils were found: crinoid columns, *Orthis* sp., *Rhynchotrema inæquivalve* (Castelnau), *Murchisonia gracilis* Hall.

Of the above species *Receptaculites occidentalis*, *Rhynchotrema inæquivalve*, *Maclurea logani*, and *Murchisonia gracilis* are common in the Black River limestones of Alumette island in the Ottawa river (above Ottawa), as learned by a comparison with material from that locality in the collections of the Geological Survey. Dr. A. F. Foerste has also found *Receptaculites occidentalis* and *Maclurea logani* in the Black River limestones of Cloche island,[1] and an undetermined *Maclurea* also occurs in the Black River rocks of Lake Nipissing.[2] Thus the Black River age of these beds is well established and their correlation with beds farther south and southeast is clear.

The 250-foot section on the east side of Dawson point, where examined by the writer, is as follows: thin-bedded buff-coloured dolomites 20 feet above the normal level of the lake; talus slope of green shaly material mixed with dolomite up to 110 feet; thin-bedded dolomites about 115 feet thick containing near their base *Pentamerus oblongus* Sowerby, *Camarotoechia? neglecta* Hall? *Atrypa reticularis* (Linnaeus); thick-bedded dolomites 25 feet thick containing numerous Niagara corals, some of which are: *Favosites gothlandicus* Lamark, *Syringopora verticillata* Goldfuss, *Halysites catenulatus* Linnaeus, *H. catenulatus* var *micropora* Whitfield, *Zaphrentis stokesi* E. and H. Thick-

[1]Guide Book No. 5, International Geological Congress, 1913, p. 86.
[2]Barlow, A. E., Geol. Surv., Can., Ann. Rep., Vol. X, pp. 122 I.

bedded, buff to light grey dolomites, 10 to 15 feet thick, form the highest point on the hill. No fossils were found in these beds.

The *Pentamerus oblongus-Atrypa reticularis* beds are probably to be correlated with the Pentamerus beds 8 to 10 feet above the base of the Niagara (Lockport) dolomite of Manitoulin island and the Bruce peninsula, and thus indicate the approximate base of the Niagara.

The same horizon also occurs on Farr island about the middle of a 12-foot section of thin-bedded blue grey limestone where the following fossils were found: *Favosites niagarensis* Hall, *Syringopora retiformis* Billings, *Halysites catenulatus* Linnaeus, *Pentamerus oblongus* Sowerby, *Gypidula* sp. and *Rhynchotreta cuneata americana* Hall ?. On the west side of Mann or Burnt island the following fossils were found, loose, on the shore: stromatoporoids, *Zaphrentis stokesi* E. and H., *Favosites niagarensis* Hall, *Halysites catenulatus* Linnaeus, *Pentamerus oblongus* Sowerby, *Rhynchotreta cuneata americana* Hall ?, *Camarotoechia obtusiplicata* (Hall) ?, *Whitfieldella* sp., *Orthoceras* sp.

Near the northwestern extremity of the island the following section occurs: 8 feet above the lake (low water) about 3 feet of thin-bedded chocolate-brown dolomite protruding through the shingle of the beach; beginning 16 feet above the lake, 10 feet of green even-bedded shale, mud-cracked near the base; on top 6 feet or more of rather thin-bedded dolomites containing the following fossils: *Streptelasma* sp., *Strophonella* sp., *Orthis flabellites* Foerste, *Pentamerus oblongus* Sowerby, *Atrypa reticularis* (Linnaeus), *Pleurotomaria* sp.

Chief island is a glaciated knob of Huronian quartzite cut by diabase dykes. The irregularities of its sloping sides contain, at a few places (Plate I A), conglomerates composed of subangular Huronian pebbles enclosed in a limestone or dolomite matrix (Plate I B). On the south side of the island, a lenticular area of dolomite about 100 feet in diameter dips downward to the lake. It appears to have a maximum thickness of about 5 feet. From this point, Barlow obtained some lower Niagara fossils. The dolomite contains throughout small pebbles of Huronian rocks.

On the east side of the island, fossils were obtained from a few square feet of dolomite, only a few inches in thickness. Here, both lower Niagara and lower Trenton species occur. The former include *Pentamerus oblongus* Sowerby, and *Atrypa reticularis* (Linnaeus). The Ordovician fossils are: *Receptaculites oweni* Hall ?, *Strophomena trentonensis* Winchell and Schuchert, *Dalmanella testudinaria* (Dalman), *Rhynchotrema inæquivalve* (Castelnau) ?.

One other Silurian locality was noted. Just north of Haileybury wharf some thin limestones protruding through the beach gravel furnished *Atrypa reticularis* (Linnaeus) and *Gypidula* sp. This is rather remarkable as at approximately the same elevation about one mile farther north, the Black River fossils occur, as already mentioned. Between the above localities two exposures about 20 feet apart and on the same north-south strike, have reversed dips, the one to the north dipping to the east at an angle of 19 degrees and the one to the south dipping to the west at an angle of 30 degrees. The strata are shattered and appear to have been disturbed by an east-west vertical fault. Thus faulting appears in this case to have been responsible for Ordovician and Silurian fossils appearing at the same level.

We have next to consider: (1) whether the shales lying below the Pentamerus horizon are of Ordovician or of Silurian age; (2) the general relations of the Ordovician and Silurian of the Lake Timiskaming region including any available evidences of faulting or other movements which may have affected the Palæozoic strata.

(1) From the available field evidence bearing upon the age of the shales we can draw only a tentative conclusion. No unconformity was observed between the shales and the Niagara strata; and the general relations and characters suggest their correlation with the Cabot Head shales of Georgian bay, belonging to the Cataract formation of upper Median age. However, the Cabot Head shales of Manitoulin island which are the nearest outcrops to the Lake Timiskaming exposures are red in colour, and thus are quite different from the shales being considered, which approach more closely in character the typical

shales at Cabot head. The alternative correlation appears to be that these shales are of Ordovician age perhaps belonging to the Cincinnatian group.

(2) With the age of the shales in doubt, the data bearing upon the relations of the Silurian and Ordovician formations are rather meagre. We will first turn to Chief island. To explain the occurrence of both Niagara and Trenton fossils in the dolomites resting in the irregularities of the Huronian, only one hypothesis appears adequate. That is, this resistant knob was washed by both Trenton and Niagaran seas, practically all of the Ordovician deposits being eroded away before the Niagara deposits were laid down.

The proximity of Niagara and Black River strata on the beach at Haileybury admits of a different explanation as already stated. The Black River outcrops west of Haileybury are 185 or more feet (based on elevation of Haileybury station) higher than the deposits near lake level, most of which are basal Niagaran. At Dawson point the basal Niagaran beds are 110 feet above the lake. Thus in the case of strata that are generally horizontal there is evidence of considerable differential movement including such faulting at least as is found near Haileybury. That a part of the difference of elevation may be due to irregularities in the floor upon which the sediments were deposited, is probable, but the conditions at Haileybury are certainly due, for the most part, to later movements. This conclusion is in accord with the statement by Dr. W. G. Miller [1]—"Along the wagon road, in lots 5 and 6 in the 3rd concession of the township of Dymond, to the northwest of the town of New Liskeard, the limestone cliff presents a striking face, indicating faulting. The fault line is continuous with the western shore of Lake Timiskaming, and furnishes still further evidence confirmatory of the theory that the lake lies along a great northwest-southeast fault."

It seems probable that Chief island and Dawson point are also separated by a fault.

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[1]Report of the Bureau of Mines, Vol. XIX, Pt. II, p. 108.

Other Northern Occurrences Related to the Black River-Trenton Formations of Lake Timiskaming.

Receptaculites oweni Hall? and *Rhynchotrema inæquivalve* (Castelnau)? from the Trenton of Chief island assist us in correlating these beds with some other northern Ordovician occurrences. Likewise *Maclurea* (*Maclurina*) *manitobensis* Whiteaves, which appears to be closely related to *Maclurea logani* Salter, of the Lake Timiskaming occurrences, is found at several northern localities. *Receptaculites oweni* and *Maclurea manitobensis* are found in the Galena-Trenton formations in the Lake Winnipeg[1] region, and also at Silliman's Fossil Mount, Frobisher bay, Baffin island.[2] *Maclurea*, probably *M. manitobensis*, is reported[3] from one horizon of the Port Clarence limestone as found on the Don river of Alaska, and *M. manitobensis* is definitely reported from limestones of the Lower Ramparts[4] of the Porcupine river of Alaska, and again along the 141st meridian between the Black and Porcupine rivers.[5]

Considering the small number of well established records of Black River and Trenton rocks in northern North America, each new discovery is of especial interest. The Lake Timiskaming occurrence furnishes additional evidence of the once broad extent of these lower Ordovician strata, and indicates that their preservation has been due to protection from erosion, in this case at least, partly resulting from down-faulting.

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[1]Whiteaves, J. F., Geological Survey of Canada, Palæozoic Fossils, Vol. III, Part III.
[2]Schuchert, Chas., Proc. U.S. National Museum, Vol. XXII, 1900, p. 149.
[3]Kindle E. M., Am. Jour. of Science, Fourth Series, Vol. XXXII, 1911, p. 342.
[4]Kindle, E. M., Bull. Geol. Soc. Am., Vol. 19, 1908, p. 323.
[5]Cairnes, D. D., Geol. Surv., Can., Summ. Rept., 1911, p. 28.

A. PLATE I.

Surface of Huronian on Chief island, upon which the Palæozoic strata rest. Dawson point in distance.

B.

Huronian rock-fragments included in basal Palæozoic dolomite. Chief island, Lake Timiskaming.

The first number of the Museum Bulletin was entitled, *Victoria Memorial Museum Bulletin, Number 1.*

The following articles of the Geological Series of Museum Bulletins have been issued.

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1. The Trenton crinoid, Ottawacrinus, W. R. Billings; by F. A. Bather.
2. Note on Merocrinus, Walcott; by F. A. Bather.
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5. Notes on some new and old Trilobites in the Victoria Memorial Museum; by P. E. Raymond.
6. Description of some new Asaphidæ; by P. E. Raymond.
7. Two new species of Tetradium; by P. E. Raymond.
8. Revision of the species which have been referred to the genus Bathyurus (preliminary paper); by P. E. Raymond.
9. A new Brachiopod from the base of the Utica; by A. E. Wilson.
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16. The Pre-Cambrian (Beltian) rocks of southeastern British Columbia and their correlation; by S. J. Schofield.
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18. A preliminary study of the variations of the plications of Parastrophia hemiplicata, Hall; by A. E. Wilson.
19. The Anticosti Island faunas; by W. H. Twenhofel.
20. The Crowsnest Volcanics; by J. D. Mackenzie.
21. A Beatricea-like organism from the middle Ordovician; by P. E. Raymond.
22. The Huronian formations of Timiskaming region, Canada; by W. H. Collins.
23. Physiography of the Beaverdell map-area and the southern part of the Interior plateaus; by L. Reinecke.
24. On Eoceratops canadensis, gen. nov., with remarks on other genera of Cretaceous horned dinosaurs; by L. M. Lambe.
25. The occurrence of glacial drift on the Magdalen islands; by J. W. Goldthwait.
26. Gay Gulch and Skookum meteorites; by R. A. A. Johnston.